SUSTAINABILITY, LOCAL ENVIRONMENTAL BEHAVIOUR AND FIRM LOCATION DECISIONS

JOSEP-MARIA ARAUZO-CAROD

Departament d'Economia (ECO-SOS & IU-RESCAT), Universitat Rovira i Virgili, Av. Universitat, 1, 43204, Reus, Catalonia Spain E-mail: josepmaria.arauzo@urv.cat (Corresponding author)

Received: November 2023; accepted August 2024

ABSTRACT

This paper uses Mercantile Register data to analyse the location decisions of firms in Catalan municipalities (between 2010 and 2019). Using count data panel estimations, we focus on local sustainability characteristics. The identification of the location patterns and the effects of local environmental policies on firms belonging to different sustainability industries constitute a contribution to the empirical location literature. Our results help in understanding entry processes at the local level and how both citizens' environmental values and local environmental policies shape these. We show that (i) firms locate differently depending on their sustainability profile and (ii) local environmental policies have stronger effects on the location decisions of sustainability-oriented firms.

Key words: Location; sustainability; waste; cities; count data; Catalonia

INTRODUCTION

Environmental policies are a growing concern for policy-makers, and they affect a wide range of economic and social dimensions. Apart from the role public regulations play in terms of shaping technologies and production processes carried out by firms, these regulations also matter in terms of the location and relocation of economic activities. In this regard, there is considerable literature on the effects of environmental regulations on Foreign Direct Investment (FDI), since multinational firms move across different geographical areas to avoid increasingly strict environmental regulations (List & Co 2000). A non-negligible proportion of offshoring/backshoring decisions are driven by such environmental concerns, but such a framework for the worldwide geographical mobility of firms is not useful when dealing with smaller areas (e.g., municipalities of the same country) having similar environmental regulations.

This paper deals with the micro-location situation (i.e., municipalities of the same country sharing a homogeneous institutional framework, but with some specificities in the implementation of local environmental policies), citizens' preferences and firm strategies in terms of waste generation and waste management. In these cases, the switch to environmental-friendly activities (or, similarly, from more polluting to less polluting activities) is not only explained by spatial asymmetries at the industry level but also by (local) policy decisions (also triggered by social preferences at the local level) that act as location determinants by favouring some activities over others.

Firms' location determinants have received increased attention in recent years in view of the positive impact of entering firms on job creation and GDP expansion.

In this sense, the empirical literature has considered both internal and external firms' location determinants, but in this paper, we focus on the latter.[1] Concretely, we analyse the role played by characteristics of the areas where firms enter. Specifically, we assume that (i) firms are not neutral to enter

Tijdschrift voor Economische en Sociale Geografie – 2025, DOI:10.1111/tesg.12651, Vol. 116, No. 1, pp. 74–90.

in alternative sites/areas that differ in their potential revenues, (ii) firms from different industries are shaped in a different way by local characteristics (i.e., they have different requirements in terms of the characteristics of the areas they enter and these characteristics influence their location decisions in a different way) and (iii) there are differences in social perception towards sustainability that shape policies implemented by city councils and firm entry decisions. Unsurprisingly, points (i) and (ii) have been much analysed in the empirical literature, and there are many papers dealing with how the local characteristics of the main determinants (e.g., agglomeration economies, transport infrastructures, human capital, wages and institutions) shape these decisions. Since this has been widely discussed, we do not attempt to go further in that direction, but rather explore a new path (i.e., point (iii)) that has hitherto received less attention, that of sustainable entries (Colombelli & Quatraro 2019) and the (increasing) role played by sustainability issues in location decisions (Chen *et al.* 2014).

As we hypothesise that not all territories have the same capacity to attract new firms, and not all firms are located looking for the same type of areas, if city councils 'signal' their engagement with environmental issues, that strategy could contribute to putting some barriers to firms from less sustainable industries and to boost attractiveness for firms from more sustainable industries. Concretely, our aim in this paper is to focus on the way in which the sustainability dimension (and social attitudes towards it) may boost firm location from sustainability-oriented industries.

Unfortunately, the effect of local environmental policies over location decisions has received considerably low attention from researchers, and the effects, if any, of such policies in attracting new firms are less evident. In this paper we consider (i) social perception and social attitudes towards sustainability issues (which are proxied by local policies such as waste collection and waste management) and (ii) actions undertaken by existing firms in the area in regard to waste management and waste generation. The idea behind this approach is that these policies and firm actions mirror social attitudes and firms' preferences that are measurable at the municipality level and that may attract/repel certain activities. So, if there are public policies promoting sustainability-oriented practices, the areas in which these policies are being implemented may be attractive to firms in sustainability-oriented (i.e., less polluting) industries, even if these policies are not directly related to firms' activities. This is a key issue in terms of policy implications, as most of the literature analyses policies at levels larger than that of the municipality, the one used in this paper. Additionally, if there are activities carried out by firms that are already generating industrial waste, these would inhibit the entry of firms in sustainability-oriented industries. Based on these considerations, we formulate the following hypothesis: 'Territories concerned about sustainability issues (in the light of decisions taken by residents, local public administrations, and existing firms) are better positioned to attract firms from sustainable industries'.

The rest of this paper is organised in the following way: Second section briefly reviews empirical literature about firms' location determinants and the role played by sustainability issues in that process. Third section details data sources, industry classification and empirical methodology. Fourth section discusses the main results. Fifth section carries out a robustness check. Finally, sixth section concludes and provides some policy recommendations.

LITERATURE REVIEW

A review of the empirical literature regarding the location patterns of new firms (see Arauzo-Carod *et al.* 2010, for a detailed analysis and Arauzo-Carod & Manjón-Antolín 2013, for a collection of empirical findings) shows, among its main results, that they (i) agglomerate in certain core areas especially national or regional capitals, (ii) look for accessible areas to minimise transport costs, (iii) seek specialised labour pools, (iv) prefer to be close to the areas where main public institutions are already located and (v) are positively influenced by the location decisions of previous entrants. Nevertheless, these location patterns are not homogeneously shared by all types of firms

– depending on the industry, the preferred territories may vary. This is easily explained by the fact that these characteristics (in terms of infrastructure, wages, labour availability, accessibility, etc.) are not homogenously distributed across regions or cities. In consequence, depending on whether territories specialise in certain activities and firms from different industries require a different profile of social and economic conditions, the matching between each firm and chosen area will depend on the characteristics of both the firms and the areas, as the notion of site suitability indicates (Witlox 2000).

Nowadays, sustainability is on the agenda of policy-makers from developed countries operating at different administrative levels. This applies to (i) national governments, interested in the promotion of a sectorial transition towards greener industries and in the overall reduction of emissions from economic activities and (ii) regional and local governments mainly interested in the attraction of environmentally friendly activities. Nevertheless, as already mentioned, public policies tend to be quite homogeneous at the local level (city councils must fit into the same regulatory framework), so they cannot be hypothesised as having a key role in firms' decisions if these are among alternative municipalities of the same institutional area (e.g., countries or regions). Simultaneously, in view of rising awareness and sensitivity regarding climate change and its consequences (Meek *et al.* 2010), environmental concerns are increasingly shared by firms aiming to contribute to social welfare in terms of sustainability (Bansal & Roth 2000). Further, there is empirical evidence suggesting that social norms related to environmental issues may affect the entry of environmentally responsible new firms (Meek *et al.* 2010) as (i) local policies not directly related to environmental requirements for firms operating in these areas (but related in general terms to environmental values) and (ii) firms' behaviour in terms of waste generation, may have indirect effects on their location decisions (De Silva *et al.* 2017).

Most empirical contributions on sustainability issues and firms' location determinants focus on the 'pollution haven' hypothesis, which suggests that firms try to avoid strict environmental regulations that push up their production costs and, in consequence, locate in areas with laxer environmental norms. This hypothesis is (roughly) supported by empirical evidence from, among others, Lin and Sun (2016) for provinces in China, Chung (2014) at country level, List and Co (2000) for US states and List and McHone (2000) for New York State.[2] Nevertheless, there are other papers (e.g., Wang *et al.* 2019) concluding that the opposite hypothesis (i.e., Porter hypothesis) is true, suggesting that stricter environmental regulations provide incentives to increase a firm's efficiency. Therefore, further analyses are needed to identify the connection between sustainability policies implemented at the local level and firm entries.

EMPIRICAL FRAMEWORK

Data sources – The data in this paper are from Catalonia, an autonomous region in north-eastern Spain whose capital is Barcelona. This is a dynamic area in terms of the entry of new firms centred around the main metropolitan areas,[3] especially that of Barcelona.

Data on firm locations are provided by the *Sistema de Análisis de Balances Ibéricos* (henceforth SABI), compiled by INFORMA D&B and by Bureau Van Dijk which contains data from the Spanish Mercantile Register. The SABI dataset contains exhaustive information at the 4-digit level on balance sheets at the firm level and has been extensively used for location analyses by many scholars.[4] This dataset includes detailed information at the firm level on, inter alia, location, number of employees, legal status and sales over the period [2010–2019].

Data on territorial characteristics come from different sources. The main one is the Waste Agency of Catalonia, the public body charged with waste management in Catalonia. Additional data come from the Association of Catalan Towns for Door-to-Door Selective Waste Collection, the Catalan Statistical Institute (IDESCAT), the Catalan Cartographical and Geological Institute (ICGC) and the Catalan Government.

Industry classification – Before analysing location patterns of firms at the industry level,

it is necessary to provide a methodological approach as to what is considered a sustainable industry considering three main constraints: the first being that we do not have data at the product level but only at the industry level for each firm; the second that we rely on the NACE 3-digit classification (which is quite broad) and the third that there is no 'official' classification of sustainability. These limitations imply that (i) we will only proxy sustainability in terms of the main industry in which firms choose to be registered, taking into account neither specific technologies or production processes used by these firms, nor any individual actions undertaken to ensure sustainable behaviour and (ii) our results are sensitive to our measure of sustainability.

In this paper, our starting point is the Central Pollution Control Board classification (CPCB 2016) which groups industries in terms of their environmental sustainability. The purpose of that classification is to analyse the industry's environmental effects (e.g., consumption of resources) to make public decisions regarding the location of plants from these industries. Concretely, for each industry a pollution index ranging between 0 and 100 is calculated by CPCB and each industry is classified as red (score 60–100), orange (41–59), green (21–40) or white (0–20).

As the industry classification was slightly different than the NACE 3-digit used in this study we adapted that classification and, for the sake of comprehension, renamed the above groups in terms of their sustainability profile as LOW (low), LOW-MED (low-medium), MED-HIGH (medium-high) and HIGH (high).[5]

Needless to say, alternative sources for an industry classification of sustainability could be found, for example, studies that analyse emissions at the industry level (Hettige *et al.* 1995) or those that consider the amount of energy required to provide a unit of output (Eskeland & Harrison 2003; Kahn 2003), but we consider that the current choice allows us to strike a reasonable balance between industry disaggregation and coverage.

Methodology – According to the characteristics of the dependent variable (i.e., number of entries by the municipality) the most appropriate econometric methodology is Count Data (CD) specifications, as many location analyses already do (see Arauzo-Carod *et al.* 2010, for a review of that literature and Becker *et al.* 2012, and Wang *et al.* 2019, for some empirical applications).

Count data (Poisson and Negative Binomial – NB – specification, among others) are especially useful if the events being analysed (i.e., the number of entries) are recorded at a highly disaggregated geographical level (e.g., municipalities), as in this paper, where 946 municipalities are used, some of them being very small and without entries for the whole period. An analysis of entries shows that smaller municipalities receive few new firms during the whole period, while bigger ones attract a much greater number. Since our data for entering firms covers a 10-year period [2010–2019], we can examine entry determinants, not only across municipalities but also across time, using a panel specification. Panel regressions have several advantages, as these (i) avoid bias in the parameter estimates characteristic of cross-section analyses, as they can control for the effects of unobserved time-invariant characteristics within geographical units and (ii) reduce potential endogeneity between dependent and independent variables.

Although most of the location literature uses cross-section approaches, Poisson panel specifications 'naturally allow for large sets of location choices with frequent zero outcomes and control for unobserved municipality heterogeneity' (Holl 2004a, p. 341). In this sense, fixed-effects strategies have been used by, among others, Holl (2004a, 2004b), Becker and Henderson (2000), List and McHone (2000) and Papke (1991). In her paper on the role of local tax differentials in locations, Papke (1991) controlled unobserved heterogeneity (which is a typical feature in location analysis as there are many alternatives) using a panel Poisson specification. Natural extensions of this specification are the Fixed-Effects NB used by Kim *et al.* (2018) and Holl (2004b). The main advantage of Fixed-Effect NB regressions as opposed to Poisson Fixed-Effects is that the geographical specific heterogeneity term is not contained in the likelihood, which means that time-invariant explanatory

variables can be used with panel data version of NB (Hausman *et al.* 1984), this not being the case for typical panel data specifications. Additionally, NB estimators for panel data can cope with the equidispersion imposed by the Poisson distribution.[6] Nevertheless, it is not obvious how to select one specification rather than another. In location analysis, overdispersion in the dependent variable may be explained by clusterisation of entries in a few areas due to unobserved location-specific heterogeneity, so a Fixed-Effects Poisson should[7] be adequate to handle such overdispersion, especially considering that it is much more robust than panel NB versions.

As for the spatial dimension of the data, spatial count data models are not yet fully developed.[8] The exceptions include Poisson Conditional Fixed-Effects (PCFE), which can handle time-invariant spatial dependence as 'in comparison with clustering as a standard approach to address cross-sectional dependence, the spatial variance estimator is more general than clustering because it allows for dependence between any pair of individuals while clustering only allows for dependence

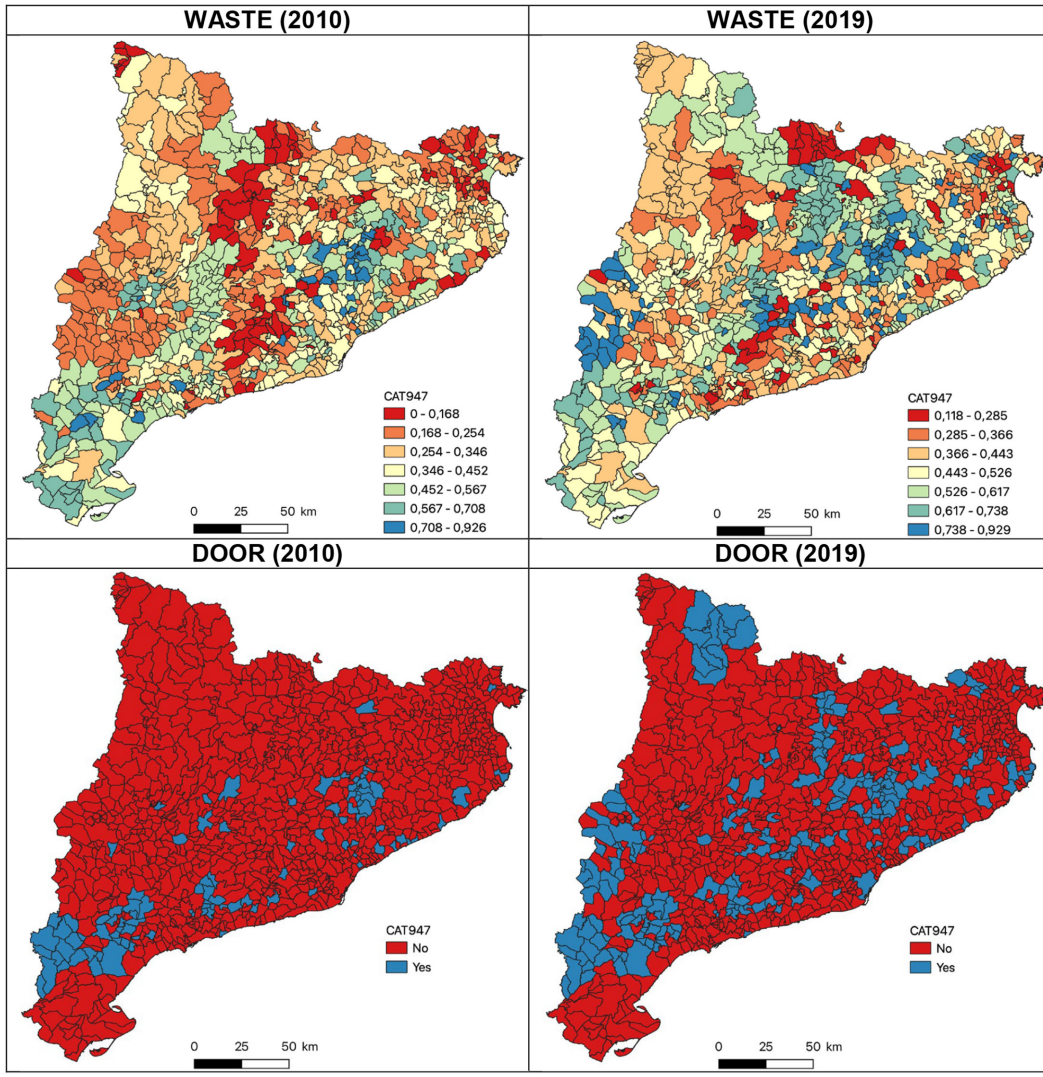

Figure 1. *Proxies of sustainability (2010 and 2019). Source: Own elaboration.*

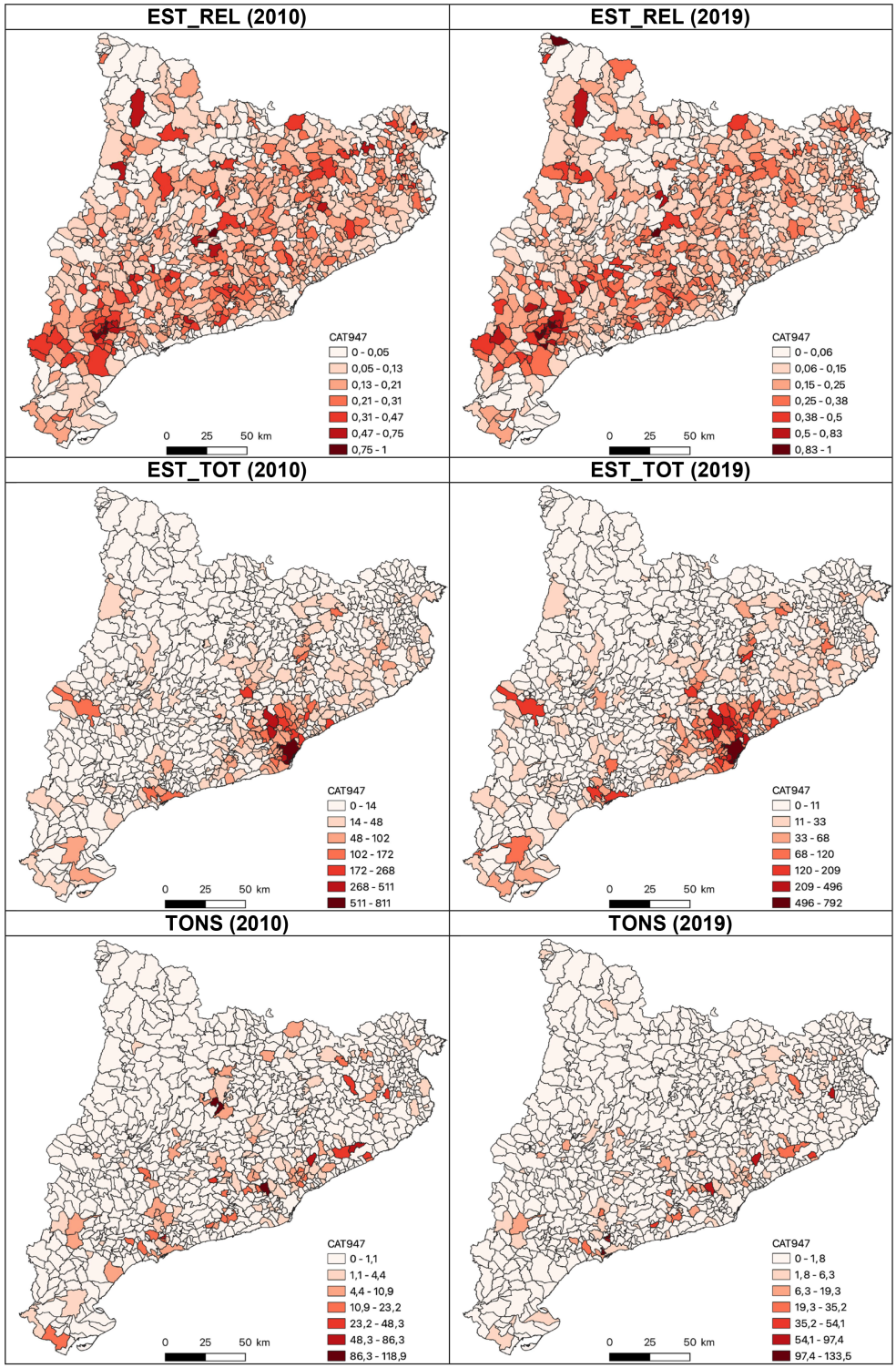

Figure 1. *(Continued)*

within groups' (Bertanha & Moser 2016, p. 50). We tested that model with our data set but, unfortunately, as the null hypothesis of time-invariant spatial dependence was not rejected, there was a need to compute the PCFE specification.[9]

Econometric specification – To analyse firm location determinants, we estimate the number of new firms at a local level as function of several local characteristics, as usual in empirical location literature. The same model is estimated for the four industry types (LOW, LOW-MED, MED-HIGH and HIGH) to identify whether social perceptions, sustainability-oriented policies and waste generation activities may influence location patterns. To better account for the role played by these dimensions we follow a parsimonious strategy in which we depart from a simple estimation including a single covariate and then we add additional covariates for each model.

We proxy the sustainability dimension through variables proxying social perception about sustainability and sustainability-oriented policies (WASTE and DOOR, which are environmentally friendly activities), and waste generation activities by firms (EST_REL, EST_TOT and TONNES, which are not environmentally friendly). Figure 1 shows spatial (across municipalities) and temporal (from 2010 to 2019) variations of the five covariates that proxy sustainable policies, behaviour and attitudes.

On the one hand, using data from waste sorting (WASTE) appears to be a good proxy for local support for sustainability issues.[10] Waste regulations in Catalonia started in 1993

Table 1. *Explanatory variables: definition, sources and descriptive statistics*

Variable	Definition	Source
WASTE	Waste separate collection (%)	Own elaboration with data from Waste Agency of Catalonia.
DOOR	Door-to-door waste collection (dummy)	Own elaboration with data from *Porta a Porta*.
EST_REL	Percentage of establishments registered at DARI (public register about manufacturing waste) over total number of establishments	Own elaboration with data from IDESCAT and Waste Agency of Catalonia.
EST_TOT	Number of establishments registered at DARI (public register about manufacturing waste)	Own elaboration with data from IDESCAT and Waste Agency of Catalonia.
TONS	Dangerous tons of waste per establishment	Own elaboration with data from IDESCAT and Waste Agency of Catalonia.
JOBS_MAN_P	Percentage of jobs in manufactures	Own elaboration with data from IDESCAT
JOBS_TOT	Total number of jobs	Own elaboration with data from IDESCAT
INCOME	General taxable income per declaring party (euros)	IDESCAT

Whole sample

Variable	Mean	Std. dev.	Min	Max
WASTE	0.399	0.159	0	0.929
DOOR	0.142	0.349	0	1
EST_REL	0.140	0.151	0	1
EST_TOT	15.840	42.710	0	811
TONS	1.561	7.912	0	133.455
JOBS_MAN_P	0.194	0.174	0	0.899
JOBS_TOT	3152.446	33,132.660	0	1,105,128
INCOME	18,665.650	4433.867	6341	56,392

Source: Own elaboration.

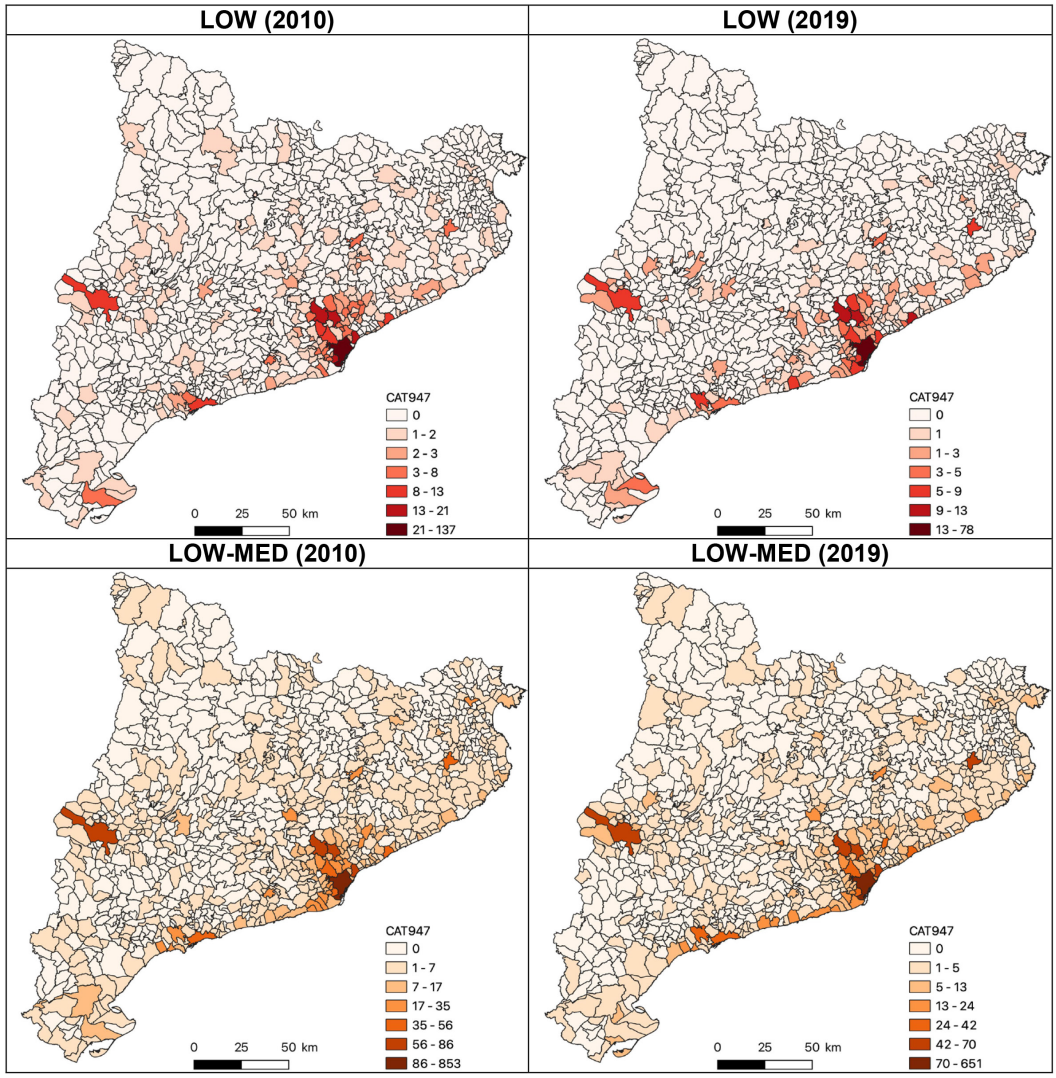

Figure 2. *Location of new firms (2010 and 2019). Source: Own elaboration.*

with a law targeting mainly industrial waste,[11] but in 1995 the Catalan government developed the Waste Local Management Program, which boosted waste sorting at the local level, although with important heterogeneities across municipalities, as local units can decide their commitment levels in terms of the type of wastes to be sorted. Nevertheless, WASTE not only proxies the commitment of city councils but also that of citizens, as waste sorting needs both, the city council to provide the appropriate infrastructure but also citizenship collaboration by sorting their own waste. Door-to-door (DOOR) waste collection policies consist of picking up the waste (previously sorted by households) from the collection point in front of each door. Different day and time slots are used depending on the type of waste. This policy was started in 2000 by four small municipalities, and since then the number of municipalities implementing this system has increased to 200. Both domestic waste sorting and door-to-door waste collection require citizenship engagement

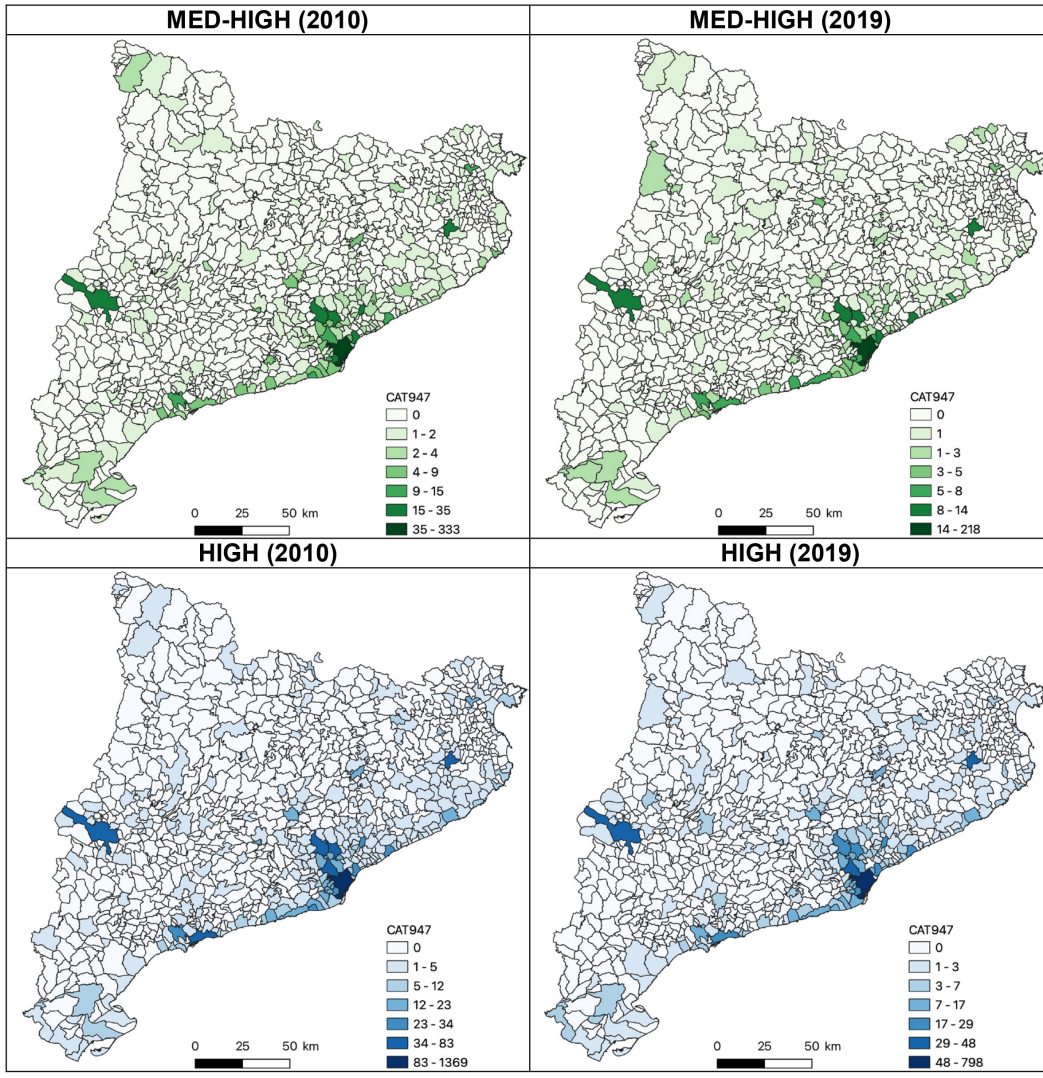

Figure 2. *(Continued)*

(i.e., citizens must pre-sort waste at home) and city council commitment (i.e., it is much more difficult to organise and manage than just collect all waste daily), so they are good proxies for environmental concerns.

Firms' waste generation activities may also influence future entries, as firms may try to avoid areas with existing polluting manufacturing activities. To proxy these activities, we use three variables that capture (i) the number of manufacturing establishments with industrial waste (EST_TOT)[12], (ii) the percentage of the total number of establishments (EST_REL) they constitute and (iii) the amount of dangerous waste (tonnes) per establishment (TONNES).

Accordingly, the number of new firm entries at a local level is estimated as a function of the aforementioned local characteristics:

$$Location_{ijt} = \beta_0 + \beta_1 WASTE_{ijt-1} + \beta_2 DOOR_{ijt-1} + \beta_4 EST\_REL_{ijt-1} + \beta_3 EST\_TOT_{ijt-1} + \beta_5 TONNES_{ijt-1} + \beta_6 \theta_{ijt-1} + \varepsilon_{ijt}$$

where $Location_{ijt}$ is the number of new firms of industry j located in municipality i in year t, $WASTE_{ijt}$ is the percentage of domestic waste sorting, $PDOOR_{ijt}$ is the door-to-door waste collection, EST_REL_{ijt} is the percentage of manufacturing establishments with industrial waste over the total number of establishments, EST_TOT_{ijt} is the number of manufacturing establishments with industrial waste, $TONNES_{ijt}$ is the number of tonnes of waste per establishment and θ_{ijt} is a vector of control variables that capture agglomeration economies[13] (total number of jobs and percentage of jobs in manufacturing) and quality of life[14] (mean income) and, therefore, their overall capacity to attract new firms (see Table 1 for a description of all variables).

In the second stage, spatially lagged versions of previous covariates are also included (concretely, W_WASTE_{ijt}, W_DOOR_{ijt}, $W\_EST\_REL_{ijt}$, $W\_EST\_TOT_{ijt}$ and W_TONS_{ijt}, as well as the ones of the control variables)[15] to test for spatial effects in location choices (Artal-Tur *et al.* 2013). Different strategies have been implemented to tackle (potential) endogeneity, such as using highly disaggregated spatial units (Holl 2004a), lagged covariates (Cissé *et al.* 2020) and spatial lags of some covariates (Piacentino *et al.* 2017).

RESULTS AND DISCUSSION

A first insight into our results shows that entering firms have similar entry patterns across time periods (i.e., 2010 vs 2019) and industries (i.e., LOW, LOW-MED, MED-HIGH and HIGH), as shown in Figure 2. Concretely, (i) most entries agglomerate in and around the metropolitan area of Barcelona and the main urban areas, (ii) MED-HIGH and HIGH industries also enter across seaside areas 100 km North and South Barcelona and along the highway network and (iii) LOW industries concentrate in relatively few municipalities, rather than dispersing across Catalonia.

Overall, our findings did not confirm the paper's hypothesis ('Territories concerned about sustainability issues (in the light of decisions taken by residents, local public administrations, and existing firms) are better positioned to attract firms from sustainable industries'), in view that although results of baseline econometric specification show that location determinants differ across industries (see Table 2) in terms of the effects of social perception of sustainability, sustainability-oriented policies and waste generation activities by existing firms, there is no a clear effect favouring attraction of sustainability-oriented firms in areas with such environmental concerns. Nevertheless, the statistical significance of proxies for these phenomena is higher for MED-HIGH and HIGH industries, than it is for LOW and LOW-MED industries, suggesting that sustainability issues play a stronger role as location determinants for sustainability-oriented industries (see De Silva *et al.* 2017, for similar results regarding Green and non-Green industries).

As for the specific effects of sustainability covariates, we must differentiate between those that proxy policies/activities that are considered to have positive environmental effects (i.e., WASTE and DOOR) and those that (may) have negative effects (i.e., EST_REL, EST_TOT and TONS). Regarding the former, DOOR has a negative and significant effect in all specifications, suggesting that the engagement of both city councils and citizens in ambitious waste-collecting programs inhibits the entry of new firms, no matter what their environmental impact (this indicates that new firms are repelled from areas with strong environmental concerns). For WASTE, the intensity of local waste sorting has (slight) negative effects on the entry of MED-HIGH (primarily) and HIGH firms, showing that entries of mature and less sustainable industries are not affected by the sustainability-oriented practices of citizens. Surprisingly, for the latter, the percentage of waste-generating plants (EST_REL) positively influences the location of MED-HIGH firms. On the contrary, the total number of waste-generation plants (EST_TOT) has the expected effect, as it reduces the entry of firms across all industries. Nevertheless, when we control by waste generated (TONS), instead of the number of firms (which includes firms of different sizes) then the effect is positive for LOW-MED and negative for MED-HIGH, indicating that while entering firms with a low-medium sustainability profile are attracted by the existence of previous polluting activities, these inhibit the entry of those having a stronger sustainability

profile. To sum up, despite these differences territories concerned about sustainability issues do not have better chances to attract firms from sustainable industries.

Extended econometric specifications including spatial effects confirm previous findings (see Table 3) and shed some light on their spatial boundaries as there are some patterns at the industry level that illustrate the role played by local sustainability-oriented policies and social perceptions in terms of location. Overall, covariates and spatially lagged covariates proxying these dimensions are more relevant for MED-HIGH and HIGH industries than for LOW and LOW-MED ones. Additionally, the significance of spatial lagged covariates increases with the industry sustainability profile, suggesting that sustainability-oriented firms take into account broader geographical areas (i.e., municipalities and their neighbours) when considering local characteristics that influence their location decisions. Following our previous distinction between activities/policies that are assumed to have positive environmental effects, and those that (may) have negative effects, it is interesting to note that while for LOW and LOW-MED industries the relevance of covariates is quite balanced between both groups, the location decisions for MED-HIGH and HIGH are clearly more negatively influenced by local policies and attitudes having a sustainability dimension (i.e., WASTE and DOOR).

We have seen some interesting results for the specific effects of covariates such as, for example, those of door-to-door waste collection policies (DOOR and W_DOOR). Generally, the effects are less significant, as for the LOW and LOW-MED cases (policies that reduce entries in most specifications but have no effects when computing the spatial lagged versions). For MED-HIGH and HIGH, they influence location decisions for both the selected municipalities and (in most specifications) for their neighbours. Regarding waste sorting, although spatial lag (W_WASTE) has a negative and significant effect only in some specifications (especially for HIGH ones and, in general terms, when computing only a limited number of covariates), there is a positive effect for LOW-MED, suggesting that some of the activities carried out by these firms could fit with the existence of local waste sorting. Finally, proxies of polluting activities (i.e., EST_REL, EST_TOT, TONS and their spatial lag counterparts) have a

Table 2. *Determinants of entries: baseline specification (Fixed-Effects Poisson with Robust Standard Errors)*[a]

Variables	LOW					LOW-MED		
WASTE	−0.509	−0.298	−0.278	0.066	0.066	−0.283	−0.099	−0.095
	(0.377)	(0.379)	(0.378)	(0.407)	(0.408)	(0.256)	(0.219)	(0.220)
DOOR		−0.236**	−0.240**	−0.289**	−0.289**		−0.212***	−0.212***
		(0.118)	(0.117)	(0.127)	(0.127)		(0.057)	(0.056)
EST_REL			−1.611	−0.655	−0.655			−0.456
			(1.293)	(1.268)	(1.268)			(0.478)
EST_TOT				−0.005***	−0.005***			
				(0.001)	(0.001)			
TONS					7.90e-05			
					(0.007)			
JOBS_MAN_P	−0.368	−0.414	−0.357	−0.025	−0.025	0.267	0.220	0.247
	(0.756)	(0.763)	(0.760)	(0.758)	(0.759)	(0.511)	(0.544)	(0.546)
JOBS_TOT	2.89e-06***	3.98e-06***	4.05e-06***	4.76e-06***	4.76e-06***	−1.65e-06***	−7.50e-07***	−7.39e-07***
	(5.64e-07)	(6.81e-07)	(6.93e-07)	(8.37e-07)	(8.36e-07)	(3.71e-07)	(2.44e-07)	(2.46e-07)
INCOME	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−3.35e-05**	−3.31e-05**	−3.34e-05**
	(1.75e-05)	(1.73e-05)	(1.77e-05)	(1.65e-05)	(1.65e-05)	(1.41e-05)	(1.36e-05)	(1.37e-05)
Obs.	4606	4606	4606	4606	4606	7278	7278	7278
N. of codes	512	512	512	512	512	809	809	809

[a]*The dependent variable is the number of entries.*
****Significance at 1%.*
***Significance at 5%.*
**Significance at 10%.*

similar (negative) effect for all industries, both for municipalities and their neighbour areas.

In all the specifications (with or without spatial lagged variables), we have controlled by the percentage of jobs in manufacture, (JOBS_MAN_P) and the total number of jobs (JOBS_TOT), proxying agglomeration economies; and the taxable income per capita (INCOME), proxying quality of life, as is usually done in empirical location literature (see, among others, List 2001; Liviano & Arauzo-Carod 2013; De Silva *et al.* 2017).

To sum up, sustainability issues play a role in terms of firms' location decisions, which suggests that local social norms on environmental issues which translate into environmentally responsible policies ultimately have an effect in terms of local economic activities. Although these policies cannot be considered as firm entry-promoting, they influence location decisions by lowering entries, because of the trade-off between environmental externalities of firms' activities and issues and environmental priorities arising from such policies.

ROBUSTNESS CHECK

The robustness of the results obtained in the previous section was tested assuming that urban asymmetries in Catalonia may bias results. Concretely, we considered that overall location patterns may be driven by several core cities (i.e., the biggest ones or those hosting main public institutions) that attract an important proportion of new firms. To deal with that, we designed two proxies of core cities: the first one included the four province capitals, and the second one included the 41 county capitals. Then we dropped province capitals and county capitals to identify whether location determinants were similar without these areas. As previous results indicated that spatial effects were relevant for some covariates, we estimated the regressions including spatial lagged variables. Overall, these results roughly mimic previous ones regarding the role played by WASTE, DOOR, EST_REL, EST_TOT and TONNES, providing enough robustness to the empirical estimations.[16]

	MED-HIGH						HIGH				
0.250	0.237	−1.206***	−1.024***	−1.049***	−0.712*	−0.688	−0.534**	−0.162	−0.160	0.102	0.074
(0.179)	(0.179)	(0.367)	(0.385)	(0.388)	(0.421)	(0.421)	(0.269)	(0.270)	(0.269)	(0.344)	(0.335)
−0.248***	−0.249***		−0.230***	−0.231***	−0.266***	−0.262***		−0.382***	−0.382***	−0.403***	−0.405***
(0.066)	(0.065)		(0.059)	(0.058)	(0.061)	(0.0630)		(0.064)	(0.064)	(0.070)	(0.068)
0.008	−4.82e-05			1.092	1.387*	1.382*			−0.959	−0.668	−0.670
(0.466)	(0.465)			(0.797)	(0.790)	(0.791)			(0.777)	(0.762)	(0.759)
−0.004***	−0.004***				−0.004***	−0.003***				−0.002***	−0.002***
(0.000)	(0.000)				(0.000)	(0.000)				(0.000)	(0.000)
	0.006**					−0.013**					0.008
	(0.003)					(0.006)					(0.007)
0.705*	0.704*	0.514	0.434	0.393	0.921	0.889	1.862***	1.627***	1.688***	2.149***	2.134***
(0.420)	(0.418)	(0.762)	(0.768)	(0.767)	(0.815)	(0.807)	(0.568)	(0.540)	(0.540)	(0.616)	(0.617)
−6.93e-08	−5.44e-08	−3.56e-07	5.64e-07	5.41e-07	1.23e-06**	1.20e-06**	−1.51e-06***	2.40e-08	4.61e-08	4.76e-07	4.86e-07
(3.26e-07)	(3.23e-07)	(4.70e-07)	(4.24e-07)	(4.20e-07)	(5.67e-07)	(5.72e-07)	(3.71e-07)	(2.53e-07)	(2.56e-07)	(4.04e-07)	(3.98e-07)
−4.35e-05***	−4.36e-05***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−5.62e-05***	−5.64e-05***	−5.70e-05***	−6.45e-05***	−6.44e-05***
(6.52e-06)	(6.54e-06)	(1.70e-05)	(1.66e-05)	(1.65e-05)	(1.48e-05)	(1.48e-05)	(1.33e-05)	(1.17e-05)	(1.18e-05)	(9.11e-06)	(9.10e-06)
7278	7278	4840	4840	4840	4840	4840	5533	5533	5533	5533	5533
809	809	538	538	538	538	538	615	615	615	615	615

CONCLUSIONS

This paper analysed the spatial distribution of entering firms in Catalan municipalities over the period 2010–2019, focusing on the sustainability dimension of the industries to which these firms belong. We built a sustainability classification based on the proposal by the Central Pollution Control Board (CPCB 2016), and grouped entering firms into four sustainability groups using a NACE 3-digit classification: LOW, LOW-MED, MED-HIGH and HIGH.

Overall, our results have shown that (i) there is a clear agglomeration of entries in and around the main metropolitan areas, especially Barcelona; (ii) there are different location patterns across industries, although there are common areas where all industries locate and (iii) industry responses (in terms of location decisions) are shaped in a different way by local sustainability issues. These results have contributed to the location literature by providing potential tools for city councils to manage the attraction of sustainability-oriented firms to boost the transition to a more sustainable economy. This is an important finding as most of the literature on environmental policies and firm location analyse national and regional regulations, but not local ones.

Our results did not confirm the hypothesis of the paper (i.e., 'Territories concerned about sustainability issues (in the light of decisions taken by residents, local public administrations, and existing firms) are better

Table 3. *Determinants of entries: extended specification with spatial effects*[a]

Variables	LOW					LOW-MED			
WASTE	−0.211	−0.011	0.010	0.217	0.229	0.037	0.205	0.210	0.382*
	(0.384)	(0.403)	(0.402)	(0.408)	(0.413)	(0.175)	(0.196)	(0.195)	(0.204)
W_WASTE	−1.287**	−0.789	−0.708	−0.122	−0.208	−1.292*	−1.133	−1.071	−0.156
	(0.633)	(0.769)	(0.745)	(0.663)	(0.689)	(0.741)	(0.844)	(0.812)	(0.415)
DOOR		−0.206	−0.212	−0.253*	−0.252*		−0.204***	−0.206***	−0.249***
		(0.144)	(0.144)	(0.146)	(0.143)		(0.069)	(0.069)	(0.071)
W_DOOR		−0.520	−0.500	−0.635	−0.636		−0.097	−0.090	−0.265
		(0.479)	(0.481)	(0.467)	(0.466)		(0.253)	(0.249)	(0.192)
EST_REL			−1.241	−0.555	−0.565			−0.320	−0.074
			(1.278)	(1.264)	(1.266)			(0.482)	(0.463)
W_EST_REL			−3.011*	−1.888	−1.717			−1.649**	−0.371
			(1.574)	(1.579)	(1.587)			(0.739)	(0.645)
EST_TOT				−0.003***	−0.003***				−0.001**
				(0.001)	(0.001)				(0.000)
W_EST_TOT				−0.006	−0.006				−0.013***
				(0.006)	(0.006)				(0.003)
TONS					6.76e-05				
					(0.007)				
W_TONS					−0.024				
					(0.017)				
JOBS_MAN_P	−0.133	−0.170	−0.135	0.019	0.030	0.518	0.503	0.531	0.796*
	(0.739)	(0.740)	(0.727)	(0.735)	(0.736)	(0.438)	(0.436)	(0.432)	(0.423)
W_JOBS_MAN_P	−2.945*	−3.225**	−3.013*	−0.952	−0.294	−2.448***	−2.666**	−2.560**	0.288
	(1.573)	(1.638)	(1.637)	(1.829)	(1.911)	(0.887)	(1.080)	(1.042)	(0.842)
JOBS_TOT	2.88e-06***	3.80e-06***	3.96e-06***	4.44e-06***	4.36e-06***	−1.03e-06***	−1.55e-07	−7.82e-08	4.06e-07
	(7.22e-07)	(9.11e-07)	(9.39e-07)	(1.09e-06)	(1.08e-06)	(3.30e-07)	(2.55e-07)	(2.60e-07)	(3.78e-07)
W_JOBS_TOT	−2.07e-05	−2.15e-05	−1.97e-05	−8.26e-06	−9.08e-06	−4.18e-05***	−4.25e-05***	−4.16e-05***	−2.32e-05***
	(1.40e-05)	(1.40e-05)	(1.37e-05)	(1.43e-05)	(1.42e-05)	(1.00e-05)	(8.90e-06)	(8.64e-06)	(6.40e-06)
INCOME	−7.36e-05**	−7.77e-05**	−8.27e-05**	−8.10e-05**	−8.02e-05**	−7.73e-06	−1.15e-05	−1.44e-05	−1.24e-05
	(3.36e-05)	(3.31e-05)	(3.37e-05)	(3.46e-05)	(3.46e-05)	(1.31e-05)	(1.25e-05)	(1.28e-05)	(1.20e-05)
W_INCOME	−2.48e-05	−1.88e-05	−2.21e-05	−3.10e-05	−2.61e-05	−7.06e-06	−2.53e-06	−3.67e-06	−1.80e-05
	(3.58e-05)	(3.66e-05)	(3.69e-05)	(3.69e-05)	(3.68e-05)	(2.14e-05)	(2.19e-05)	(2.18e-05)	(1.71e-05)
Obs.	4606	4606	4606	4606	4606	7278	7278	7278	7278
No. of codes	512	512	512	512	512	809	809	809	809

[a]*The dependent variable is the number of entries.*
****Significance at 1%.*
***Significance at 5%.*
**Significance at 10%.*

positioned to attract firms from sustainable industries'), as although covariates proxying sustainability issues have different effects on entries of different industries (i.e., the effect is stronger for sustainability-oriented industries, while less-sustainable ones are less affected by this dimension), the effect is also negative for sustainability-oriented ones. Accordingly, territories concerned about sustainability issues do not have better chances to attract firms from sustainable industries (i.e., MED-HIGH and HIGH). This empirical evidence suggests that the challenge is to design local sustainability-oriented policies able to both improve the quality of the local environment and signal the area to attract sustainability-oriented activities. This is quite important, as matching firm's activities with local social and public norms may indicate relevant courses of action (Meek *et al.* 2010). In fact, our empirical evidence suggests that there is a mismatch between public debates about the importance of sustainability, the policies implemented by city councils and the firms' strategies in terms of the characteristics and location of economic activities to be carried out.

There are some policy implications from the previous results, as they show that structural changes towards more sustainable activities require (new) specific policy actions to boost the process, which suggests that additional public efforts should be implemented to reorient the industry composition of new entrants towards a stronger sustainable profile. Nevertheless, as these entrants are affected by the prevalent socio-environmental

	MED-HIGH					HIGH				
0.376*	−0.798**	−0.627	−0.642	−0.440	−0.395	−0.033	0.315	0.330	0.437	0.422
(0.205)	(0.372)	(0.398)	(0.400)	(0.403)	(0.396)	(0.248)	(0.296)	(0.294)	(0.304)	(0.297)
−0.179	−1.056	−0.600	−0.527	0.505	0.443	−1.965***	−1.219**	−1.129**	−0.644	−0.675
(0.421)	(0.667)	(0.769)	(0.752)	(0.650)	(0.660)	(0.558)	(0.580)	(0.560)	(0.520)	(0.527)
−0.250***		−0.188**	−0.190**	−0.236***	−0.230***		−0.328***	−0.329***	−0.340***	−0.340***
(0.069)		(0.078)	(0.078)	(0.065)	(0.065)		(0.086)	(0.087)	(0.086)	(0.082)
−0.265		−0.627	−0.635	−0.856*	−0.872*		−0.959***	−0.972***	−1.065***	−1.067***
(0.191)		(0.480)	(0.478)	(0.470)	(0.469)		(0.331)	(0.325)	(0.320)	(0.321)
−0.087			1.051	1.201	1.178			−1.070	−0.902	−0.913
(0.462)			(0.798)	(0.787)	(0.788)			(0.769)	(0.755)	(0.755)
−0.311			−1.267	−0.008	0.146			−2.048**	−1.357*	−1239
(0.645)			(1.000)	(0.955)	(0.958)			(0.864)	(0.789)	(0.787)
−0.001**				−0.001	−0.001				−0.002***	−0.001***
(0.000)				(0.001)	(0.001)				(0.000)	(0.000)
−0.013***				−0.014*	−0.014*				−0.000	−0.000
(0.003)				(0.008)	(0.008)				(0.003)	(0.003)
0.006**					−0.013**					0.007
(0.003)					(0.006)					(0.006)
−0.007					−0.018*					−0.009
(0.007)					(0.011)					(0.011)
0.797*	0.508	0.438	0.437	0.811	0.726	1.641***	1.541***	1.598***	1.708***	1.692***
(0.421)	(0.830)	(0.830)	(0.834)	(0.816)	(0.813)	(0.576)	(0.565)	(0.558)	(0.569)	(0.567)
0.455	−1.376	−1.746	−1.726	1.503	2.161	0.999	0.052	0.295	1362	1616
(0.879)	(1.310)	(1.205)	(1.205)	(1.503)	(1.617)	(1.541)	(0.855)	(0.902)	(1.226)	(1.397)
3.92e-07	1.31e-07	7.96e-07*	8.36e-07*	1.42e-06**	1.31e-06**	−9.81e-07***	1.42e-07	2.37e-07	5.82e-07	5.52e-07
(3.67e-07)	(4.55e-07)	(4.82e-07)	(4.89e-07)	(5.82e-07)	(5.75e-07)	(2.89e-07)	(3.17e-07)	(3.28e-07)	(4.56e-07)	(4.30e-07)
−2.33e-05***	−3.26e-05**	−3.28e-05**	−3.23e-05**	−1.26e-05	−1.38e-05	−3.22e-05***	−3.15e-05***	−2.98e-05***	−2.60e-05***	−2.61e-05***
(6.48e-06)	(1.48e-05)	(1.43e-05)	(1.41e-05)	(1.52e-05)	(1.52e-05)	(1.20e-05)	(8.80e-06)	(8.42e-06)	(8.51e-06)	(8.51e-06)
−1.24e-05	−2.32e-05	−2.88e-05*	−3.13e-05*	−2.69e-05	−2.68e-05	2.48e-05*	1.21e-05	9.90e-06	1.19e-05	1.18e-05
(1.20e-05)	(1.73e-05)	(1.73e-05)	(1.76e-05)	(1.70e-05)	(1.71e-05)	(1.45e-05)	(1.21e-05)	(1.22e-05)	(1.14e-05)	(1.13e-05)
−1.66e-05	−8.44e-05***	−7.60e-05**	−7.56e-05**	−9.52e-05***	−8.94e-05***	−6.88e-05***	−5.26e-05**	−5.62e-05**	−6.63e-05***	−6.39e-05***
(1.75e-05)	(2.86e-05)	(3.01e-05)	(2.98e-05)	(2.75e-05)	(2.79e-05)	(2.17e-05)	(2.34e-05)	(2.27e-05)	(1.97e-05)	(2.04e-05)
7278	4840	4840	4840	4840	4840	5533	5533	5533	5533	5533
809	538	538	538	538	538	615	615	615	615	615

norms of an area, understanding these norms may play a role when designing entry-promoting measures. Finally, this paper has two potential limitations. The first one is in regard to the *ad-hoc* classification for sustainability that we use. Here, we acknowledge a potential bias in our results due to the allocation of 3-digit industries to a particular group. Future research will try to solve this issue by exploring alternative groupings in terms of the sustainability profiles of entering firms. The second one refers to the specific institutional setting covered by this analysis (i.e., municipalities at the EU level), since results may not fully generalise to other areas such as developing economies (this highlights the necessity of extending similar analyses to other countries).

ACKNOWLEDGEMENTS

I would like to acknowledge research assistance by M. Lleixà, I. Merkushov and B. Arauzo, and the helpful and supportive comments of participants at the 2nd Symposium on Circular Economy and Sustainability, 13th World Congress of the RSAI, 23rd INFER Annual Conference, XLVI International Conference on Regional Science and 4th GCD Workshop on Regional Development and Innovation. Any errors are, of course, my own.

Endnotes

[1]Readers interested in internal location determinants should check business-oriented papers dealing with characteristics such size and industry, among others, that may (partially) explain why, when, where and how firms enter markets (Fotopoulos & Spence 1998).

[2]Jeppesen *et al.* (2002) provide a broader view using a meta-analysis technique.

[3]Catalonia has about 7.7 million inhabitants (16% of Spain's population) and a surface area of 31,895 km^2. It accounts for 20% of Spanish GDP.

[4]SABI is the most common data source for studies based on the location of economic activity in Spain thanks to the granularity that provides, as firms are georeferenced using coordinates. Although this dataset provides a clear picture of the overall distribution of economic activity, it is about firms, not about establishments. This issue could be a problem in the case of multi-plant firms, but according to data from 2006 multi-plant firms are about 1% of the total number of firms in Spain (Jofre-Monseny *et al.* 2018), so potential bias is not relevant at all. There are alternative data sources such as DIRCE or the Social Security, but although they coverage is better, they provide data in a very aggregated way (i.e., 2 digits industries), which prevents from identifying industries in terms of their sustainability profile as we do in this paper.

[5]As this typology from CPCB (2016) was adapted for the purposes of this paper, there are no endogeneity issues such as municipalities trying to attract firms belonging to what are considered sustainable industries.

[6]There are other studies using non-CD panel models for the analysis of firms' location decisions, which include Becker *et al.* (2012) and Jeppesen *et al.* (2002).

[7]Hausman test's results suggested using a FE model rather than an RE one.

[8]There are other alternatives for dealing with spatial issues in a panel framework, such as Spatial Error and Spatial Lag Models (Bernardini Papalia & Bertarelli 2009) and Fixed Effects Spatial Durbin Model (Ho & Berggren 2020) but due to the nature of our dependent variable, count of new firms, they are not considered in this paper.

[9]Results are available upon request.

[10]Alternative measures could include manufacturing and construction waste management plants, but using that information has several limitations, as these plants are a mixture of private/public property, they do not directly serve municipalities (as firms may choose which one to use) and available data does not include activity records on a yearly basis.

[11]See *Llei 6/1993, de 15 de juliol*, by the Catalan Parliament.

[12]Manufacturing establishments that generate manufacturing waste must register at DARI (*Declaració Anual de Residus Industrials*).

[13]Agglomeration economies are for sure the main determinant of location of new economic activities (see seminal contribution by Marshall 1890), as is widely acknowledged that there is a direct linkage between size of economic activity of a given area and its capacity to attract additional firms (see Arauzo-Carod *et al.* 2010, for a detailed review about empirical contributions).

[14]Quality of life is expected to exert a negative effect over location of economic activity as firms and residents may compete for the same areas and

generate mutual negative externalities between them.

[15]The W-matrix used for spatial lags calculation is a row-standardised one for which neighbourhood criterion is a distance-based one. Concretely, we use the minimum distance (11.2 km) to ensure that all municipalities have at least 1 neighbour. The minimum number of neighbours is thus 1 and the maximum is 34 (mean = 13.9). Additionally, alternative W-matrixes have been tested without significant changes. For the sake of estimation simplicity and trying to focus on the variables with a clear spatial dimension, we decided not to include spatially lagged versions of POP_JOBS and POPC. In this sense, population data were already included in POP and W_POP variables.

[16]In all the estimations, we rejected the null hypothesis of time-invariant spatial dependence, which implies that there is no need to compute the Poisson Conditional Fixed-Effects specification.

REFERENCES

Arauzo-Carod, J.M. & M. Manjón-Antolín (2013), New Insights in Industrial Location. *Tijdschrift voor Economische en Sociale Geografie* 104(2), pp. 133–135.

Arauzo-Carod, J.M., D. Liviano-Solís & M. Manjón-Antolín (2010), Empirical Studies in Industrial Location: an Assessment of their Methods and Results. *Journal of Regional Science* 50(3), pp. 685–711.

Artal-Tur, A., J.M. Navarro-Azorín, L. Alamá-Sabater & A.J. Briones-Peñalver (2013), Spatial Effects in Industrial Location Choices: Industry Characteristics and Urban Accessibility. *Tijdschrift voor Economische en Sociale Geografie* 104(2), pp. 159–174.

Bansal, O. & K. Roth (2000), Why Companies Go Green: A Model of Ecological Responsiveness. *The Academy of Management Journal* 43(4), pp. 717–736.

Becker, R. & V. Henderson (2000), Effects of Air Quality Regulations on Polluting Industries. *Journal of Political Economy* 108, pp. 379–421.

Becker, S.O., P.H. Egger & V. Merlo (2012), How Low Business Tax Rates Attract MNE Activity: Municipality-Level Evidence from Germany. *Journal of Public Economics* 96, pp. 698–711.

Bernardini Papalia, R. & S. Bertarelli (2009), The Role of Local Agglomeration Economies and Regional Characteristics in Attracting FDI: Italian Evidence. *International Journal of the Economics of Business* 16(2), pp. 161–188.

Bertanha, M. & P. Moser (2016), Spatial Errors in Count Data Regressions. *Journal of Econometric Methods* 5(1), pp. 49–69.

Chen, L., J. Olhager & O. Tang (2014), Manufacturing Facility Location and Sustainability: A Literature Review and Research Agenda. *International Journal of Production Economics* 149, pp. 154–163.

Chung, S. (2014), Environmental Regulation and Foreign Direct Investment: Evidence from South Korea. *Journal of Development Economics* 108, pp. 222–236.

Cissé, I., J. Dubé & C. Brunelle (2020), New Business Location: How Local Characteristics Influence Individual Location Decision? *The Annals of Regional Science* 64(1), pp. 185–214.

Colombelli, A. & F. Quatraro (2019), Green Start-ups and Local Knowledge Spillovers from Clean and Dirty Technologies. *Small Business Economics* 52, pp. 773–792.

CPCB (2016), *Final Document on Revised Classification of Industrial Sectors Under Red, Orange, Green and White Categories*, Delhi: Central Pollution Control Board.

De Silva, D.G., T.P. Hubbard, R.P. McComb & A.R. Schiller (2017), Entry, Growth and Survival in the Green Industry. *Regional Studies* 51(12), pp. 1774–1785.

Eskeland, G.S. & A.E. Harrison (2003), Moving to Greener Pastures? Multinationals and the Pollution Haven Hypothesis. *Journal of Development Economics* 70, pp. 1–23.

Fotopoulos, G. & N. Spence (1998), Accounting for Net Entry into Greek Manufacturing by Establishments of Varying Size. *Small Business Economics* 11(2), pp. 125–144.

Hausman, J., B.H. Hall & Z. Griliches (1984), Econometric Models for Count Data with an Application to the Patents - R&D Relationship. *Econometrica* 52, pp. 909–938.

Hettige, H., P. Martin, M. Singh & D. Wheeler (1995), IPPS: The Industrial Pollution Projection System. World Bank Policy Research Working Paper 1431.

Ho, C.S.T. & B. Berggren (2020), The Effect of Bank Branch Closures on New Firm Formation: The Swedish Case. *The Annals of Regional Science* 65, pp. 319–350.

Holl, A. (2004a), Manufacturing Location and Impacts of Road Transport Infrastructure:

Empirical Evidence from Spain. *Regional Science and Urban Economics* 34, pp. 341–363.

Holl, A. (2004b), Start-ups and Relocations: Manufacturing Plant Location in Portugal. *Papers in Regional Science* 83, pp. 649–668.

Jeppesen, T., J.A. List & H. Folmer (2002), Environmental Regulations and New Plant Location Decisions: Evidence from a Meta-Analysis. *Journal of Regional Science* 42(1), pp. 19–49.

Jofre-Monseny, J., M. Sánchez-Vidal & E. Viladecans-Marsal (2018), Big Plant Closures and Local Employment. *Journal of Economic Geography* 18(1), pp. 163–186.

Kahn, M.E. (2003), The Geography of US Pollution Intensive Trade: Evidence from 1958 to 1994. *Regional Science and Urban Economics* 33, pp. 383–400.

Kim, H., S. Ahn & G.F. Ulfarsson (2018), Transportation Infrastructure Investment and the Location of New Manufacturing around South Korea's West Coast Expressway. *Transport Policy* 66, pp. 146–154.

Lin, L. & W. Sun (2016), Location Choice of FDI Firms and Environmental Regulation Reforms in China. *Journal of Regulatory Economics* 50, pp. 207–232.

List, J.A. (2001), US County-Level Determinants of Inbound FDI: Evidence from a Two-Step Modified Count Data Model. *International Journal on Industrial Organization* 19, pp. 953–973.

List, J.A. & C.Y. Co (2000), The Effects of Environmental Regulations on Foreign Direct Investment. *Journal of Environmental Economics and Management* 40, pp. 1–20.

List, J.A. & W.W. McHone (2000), Measuring the Effects of Air Quality Regulations on "Dirty" Firm Births: Evidence from the Neo- and Mature-Regulatory Periods. *Papers in Regional Science* 79, pp. 177–190.

Liviano, D. & J.M. Arauzo-Carod (2013), Industrial Location and Interpretation of Zero Counts. *The Annals of Regional Science* 50, pp. 515–534.

Marshall, A. (1890), *Principles of Economics*, London: MacMillan.

Meek, W.R., D.F. Pacheco & J.G. York (2010), The Impact of Social Norms on Entrepreneurial Action: Evidence from the Environmental Entrepreneurship Context. *Journal of Business Venturing* 25, pp. 493–509.

Papke, L.E. (1991), Interstate Business Tax Differentials and New Firm Location. *Journal of Public Economics* 45, pp. 47–68.

Piacentino, D., F. Bono, M.F. Cracolici & D. Giuliani (2017), A Spatial Analysis of New Business Formation: Replicative Vs Innovative Behaviour. *Spatial Statistics* 21, pp. 390–405.

Wang, X., C. Zhang & Z. Zhang (2019), Pollution Haven or Porter? The Impact of Environmental Regulation on Location Choices of Pollution-Intensive Firms in China. *Journal of Environmental Management* 248, 109248.

Witlox, F. (2000), Towards a Relational View on Industrial Location Theory. *Tijdschrift voor Economische en Sociale Geografie* 91(2), pp. 135–146.